

FORM PTO-1390 (Modified)
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U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

RCA 89549

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

10/009298

INTERNATIONAL APPLICATION NO.

PCT/US00/15760

INTERNATIONAL FILING DATE

8 June 2000 (08.06.00)

PRIORITY DATE CLAIMED

16 June 1999(16.06.99)

TITLE OF INVENTION

REAL-TIME SIGNAL STRENGTH MEASUREMENT AND DISPLAY OF DIGITAL TELEVISION SIGNALS

APPLICANT(S) FOR DO/EO/US

Scott Edward Klopfenstein, Aaron Hal Dinwiddle, Daniel Richard Schneidewend

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☒ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☐ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☒ Certificate of Mailing by Express Mail
23. ☒ Other items or information:

Return Postcard Receipt

EXPRESS MAIL LABEL NO. EK816049604US

DATE DEPOSITED: December 4, 2001

RCA 89549

CALCULATIONS PTO USE ONLY

\$890.00

\$0.00

TOTAL OF ABOVE CALCULATIONS	=	\$890.00
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\$0.00

SUBTOTAL =	\$890.00
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\$0.00

TOTAL NATIONAL FEE	=	\$890.00
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\$40.00

TOTAL FEES ENCLOSED	=	\$930.00
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a. ☐ A check in the amount of _____ to cover the above fees is enclosed.

b. ☒ Please charge my Deposit Account No. 07-0832 in the amount of \$930.00 to cover the above fees.
A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 07-0832. A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

DATE _____

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Scott Edward Klopfenstein, Aaron Hal Dinwiddie,
Daniel Richard Schneidewend

Filed : Herewith

For : REAL-TIME SIGNAL STRENGTH MEASUREMENT AND
DISPLAY OF DIGITAL TELEVISION SIGNALS

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Sir:

In the US national phase application of PCT/US00/15760 filed
herewith, please enter the following amendments:

IN THE SPECIFICATION:

Please amend the specification as follows: A marked-up version of the
specification is attached hereto.

On Page 1, please amend line 8 to read as follows:

--July 12, 1999, which is hereby incorporated herein by reference, and
which claims the benefit under 35 U.S.C. § 365 of International Application
PCT/US00/15760, filed June 8, 2000, which was published in accordance with PCT
Article 21(2) on December 21, 2000 in English.--

IN THE ABSTRACT:

Please add the following Abstract.

--An HDTV receiver coupled to a terrestrial antenna displays
real-time signal strength of terrestrial digital television signals. A graphical user
interface preferably displays various data relating to all terrestrial television signals in
a scrollable grid format. The grid is displayed within an active video display of a
selected television signal from the grid. Audio for the selected channel is also active.

A list of all channels tuned or selected is maintained to aid in searching. Channel lists are updated during certain channel searches.--

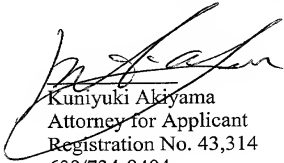
REMARKS

The specification has been amended to include a more complete reference to the priority applications.

To meet the requirements of the United States, the Abstract (as originally filed in the PCT application) is added.

No fee is believed to have been incurred by virtue of this amendment. However if a fee is incurred on the basis of this amendment, please charge such fee against deposit account 07-0832

Respectfully submitted,
Scott Edward Klopfenstein
Aaron Hal Dinwiddie
Daniel Richard Schneidewend



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December 4, 2001

MARKED UP VERSION OF THE AMENDED SPECIFICATION

On Page 1, please amend line 8 to read as follows:

--July 12, 1999, which is hereby incorporated herein by reference, and which claims the benefit under 35 U.S.C. § 365 of International Application PCT/US00/15760, filed June 8, 2000, which was published in accordance with PCT Article 21(2) on December 21, 2000 in English.--

REAL-TIME SIGNAL STRENGTH DISPLAY OF TERRESTRIAL DIGITAL TELEVISION SIGNALS**CROSS-REFERENCE TO RELATED APPLICATIONS**

5 This is a non-provisional patent application based on co-pending provisional patent application, serial number 60/139,467 filed June 16, 1999, and co-pending provisional patent application serial number 60/143,341, filed July 12, 1999.

BACKGROUND OF THE INVENTION**1. Field of the Invention**

10 The present invention relates to digital television signals and, more particularly, to the receipt and measurement of off-air digital television signals.

2. Description of the Related Art

High Definition television (HDTV) sets and other digital digital set-top
15 boxes must be able to receive digital signals, for example, terrestrial television signals. Terrestrial digital television signals will be received by the television set typically in addition to digital television signals from other sources. These other sources, such as cable and satellite (i.e., DBS), generally provide television signals at a standard signal strength that is sufficient to allow the television
20 receiver to process and use the incoming digital television signal.

With both analog and digital off-air television signals, it is necessary to connect an antenna to the television set. If several digital channels are available, the user may be required to manually adjust the antenna in order to receive the best possible reception from all available channels. It is known to provide a
25 channel search routine that will obtain a discrete sample or "snapshot" of all the currently available channels on the various antenna inputs. The channel search routine then stores the channels detected during the search in memory (e.g. EEPROM), deleting any channels previously stored that are not now currently available. At power-up of the unit, the channels in EEPROM become the channel
30 list. If the user were to adjust or relocate the antenna, the signal strength of some digital signals (channels) may be too low to tune (or receive). Therefore at power-up or if the user runs a channel search, various channels may be deleted.

Further, weak channels are removed to allow for the case where a user moves to another broadcast location (off-air, cable, or DBS).

It may be the case that several digital television signals are available to the user but only if the antenna is manually adjusted to achieve the best possible reception for the various channels. To efficiently achieve the best antenna placement, the user would need to know the signal strengths of the various digital television channels. Also, with the use of a rotor and control electronics, the best position for the antenna relative to each digital television channel could be obtained, stored, and utilized, if the signal strength of each digital television channel were known.

SUMMARY OF THE INVENTION

A dish pointing screen (an on-screen display or OSD) is currently used in Digital Broadcast Satellite (DBS) products which indicates the dish's orientation without concurrently displaying and/or reproducing the audio/video signal or displaying the signal strength of off-air digital television channels. In one aspect of the present invention, the currently tuned channel may be displayed, in the background and its respective entry will be highlighted. If a valid channel is not displayed, then the first channel in the list may be highlighted.

In accordance with one aspect of the present invention, there is provided a method and apparatus for displaying real-time signal strength of off-air digital television signals. An Antenna Information (Info) program/routine preferably utilizing a graphical user interface is adapted to compile a list of received channels, to display signal strength relating to any or all of the received digital channels in real-time, and to play the audio and video of any particular channel, for any antenna input. Since audio and video are active during the real-time display of signal strength, this allows the user to find the lowest signal strength that will provide an acceptable level of audio and video quality, i.e., a cut-off threshold. Finding the cut-off threshold is particularly useful when digital broadcasts come from different directions and the terrestrial antenna cannot be pointed in both directions.

In accordance with another aspect of the present invention, a user may switch to a different antenna input while the Antenna Information routine is active. Doing this will refresh the channel list to represent the available channels on the new antenna input. All of the channels obtained by a channel search over
5 a period of time are retained in an Antenna Information List for use by the Antenna Information routine. Antenna Information can thus be a listing of every channel that has ever been added to a channel list by a channel search. For every channel in the channel list, the Antenna Information routine will try to get the tuner (or selector) to connect to a signal on the various channel frequencies.
10 If the tuner is successful in receiving a usable television signal, the channel is retained in the channel list. If the television signal is digital, the strength of the signal will be at least measured, and possibly displayed.

The value of Antenna Info is to check the signal strength of digital channels while changing the antenna position. Antenna Info will usually include
15 only the current antenna rather than both antennae simultaneously.

In accordance with an aspect of the present invention, the user has the ability to scroll through a list of channels that are currently in the channel list. When any specific channel is selected, the tuner will play audio and video for that channel, as the real-time signal strength is updated on-screen (digital
20 channels only). The list of channels that are currently available includes both analog and digital channels in order to provide the user with an integrated channel screen where the effects of an antenna adjustment on both digital and analog channels may be easily seen.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood by reference to the following drawings, wherein:

Fig. 1 depicts a multimedia system adapted to receive and utilize digital television signals;

30 Fig. 2 is a program flow chart of a search routine invoked during a Channel Search in accordance with an aspect of the present invention ;

Fig. 3 is a program flow chart of a search routine that adds a channel to the Channel List and Antenna Info List as a result of a discrete digital entry, in accordance with an aspect of the present invention;

Fig. 4 is a program flow chart of a power-up routine in accordance with an aspect of the present invention;

Fig. 5 is a program flow chart of a search routine invoked during an Antenna Info search in accordance with an aspect of the present invention; and

Fig. 6 is a depiction of a program screen as displayable on a display unit particularly showing Antenna Information Results in accordance with an aspect of the present invention.

Corresponding reference characters indicate corresponding parts throughout the several views.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig. 1, there is shown a simplified, functional block diagram of a multimedia system 10. Multimedia system 10 may include TV or monitor 12 and DBS and/or set-top box receiver 14, which is in communication with TV 12 via communication line 16 as is known in the art. DBS (Direct Broadcast Satellite) receiver 14 is in communication with dish (or antenna) 18 via communication line 20 as is known in the art. Dish 18 receives digital multimedia and/or data signals, e.g. television, music and/or internet signals (hereinafter collectively "television signals"), that are focused onto and received by feedhorn/LNA (Low Noise Amplifier) unit 22. Feedhorn/LNA unit 22 typically receives and slightly amplifies the received television signals and transmits the amplified television signals to DBS receiver 14 for processing. DBS unit 14 may also be coupled to a CATV or cable system (not shown) via cable input line 24. TV 12 may be coupled to antenna or aerial 26 via communication line 28. Antenna 26 is designed to receive off-air or non-satellite broadcast digital or analog television signals. As such, antenna 26 is generally adjustable either manually or automatically. The off-air television signals are fed into tuner 30 for discriminating or tuning the various channels and receiving any data signals as is known in the art.

Tuner 30 is in communication with microcontroller unit ("μC") 32 such that digital television signals received from antenna 26 are received and processed by microcontroller unit 32 as is known in the art. In addition to other functions as are known in the art, microcontroller unit 32 provides control and/or
5 implementation of the various software programs/routines and is in communication with various components in accordance with the various aspects of the present invention. Microcontroller unit 32 is in communication with additional memory 34, e.g. EEPROM, RAM, ROM, and display 36. TV 12 may also include left and right speakers 38a and 38b, respectively, coupled to
10 microcontroller unit 32 via audio communication lines 40a and 40b, respectively, for providing audio output for the user.

Additionally, microcontroller unit 32 includes the ability to generate, process, and display OSD information/data on display 36. The OSD information/data may be part of a received television signal or may be generated
15 internally. Such OSD information may include channel number, time, signal strength, on-screen electronic program guides (EPGs), internet data, pop-up windows, on-screen electronic programming menus, and the like. Microcontroller unit 32 also runs various software necessary to process and/or utilize the incoming digital signals as is known in the art and additionally as provided herein.

It should be understood that microcontroller unit 32 by itself or along with tuner 30 and memory 34 form a module capable of implementing the present invention. This module may be totally separate (discrete module) or may incorporate existing constituents of the various components (virtual module). In this manner, the module may be incorporated into TV 12, DBS/Set-Top Receiver
20 Unit 14, or any other digital component capable of receiving and/or utilizing digital television signals.

Referring now to Fig. 6 there is depicted display 36 showing program screen 44. Program screen 44 is an exemplary screen indicative of a typical programming/menu/information ("program") screen into which the present
30 invention may be incorporated. Included on program screen 44 is a plurality of menu items/programs/functions 50 available for possible selection by the user

and implementation by the unit. In accordance with an aspect of the present invention, one such menu item 50 is "Antenna Info" (Antenna Information) 52.

Antenna Info 52 is a menu choice for invoking the Antenna Information program, function or routine from a main or auxiliary screen or through a separate button on a remote. Upon selection of Antenna Info either by button or menu choice, context sensitive textual help may be displayed on a portion of program screen 44 to assist the user.

The Antenna Information process provides real-time signal strength of the received digital signal (e.g., terrestrial or satellite television signals) and helps the user adjust his terrestrial antenna (e.g., antenna 26 of Fig. 1) to receive the greatest number of digital television channels that satisfy a minimum signal strength threshold. Therefore, the actual adding of both analog and digital channels to the current tuning capability of the television or set-top box and the building of a Channel List representative thereof, is done by the Channel Search function/routine. The search performed by Antenna Info may be separate from the Channel Search function and may be invoked from another program screen. When a signal or channel scan is performed by the Channel Search routine, only those analog and digital channels that have a signal strength above a certain threshold criterion is added to the Channel List which is stored in memory (e.g., EEPROM). The Channel List is thus a stored list of currently available analog and digital television channels that will be displayed during channel scanning/surfing by the user.

The actions performed by a Channel Search may be summarized by the following table, which identifies what occurs to the Channel List and

Action	Channel List	Antenna Info List
Find good channel	Add	Add
Find bad channel	Remove	No-Change

the Antenna Info List which is stored separately from the Channel List and utilized for a different purpose during a Channel Search. With additional reference to Fig. 2, there is depicted program flow chart 70 for the Channel Search routine. Upon selection, the Channel Search is started 72 and the next frequency starting from a chosen frequency is scanned 74. If there is not a next

frequency, the routine is done 76. When a next frequency is encountered, it is determined whether there is a usable signal on the frequency/channel 78. Usable may be determined by applying a threshold signal strength for the incoming signal to overcome or other parameter or set of parameters. For each incoming frequency/channel that does not meet threshold signal strength requirements or otherwise, the channel is removed from the Channel List 75 and a next frequency is determined 74. A continuous non-receipt of usable channels results in a loop until there are no more next frequencies available. For each incoming frequency/channel that meets the threshold signal strength requirements or otherwise, the channel is added to the Channel List and the Antenna Info List in step 80. The process repeats until there is no next frequency as determined in step 74.

With reference to Fig. 3 there is depicted a program flow chart 82 for automatically adding channels to the Channel List. When a user inputs discrete digits for a particular channel 84, generally from a keypad of a remote (not shown), the program begins. Upon receipt of the channel number, it is determined whether there is a usable signal on the frequency/channel 86. If there is no usable signal, the program terminates 88. If there is a usable signal that channel is added to the Channel List and the Antenna Info List 90.

With reference to Fig. 4 there is depicted a program flow chart 92 for adding channels to the Antenna Info List, generally unbeknownst to the user. When the power to the unit is turned on at step 94 the next channel that is in EEPROM is scanned to determine if there is an available signal 96. If not, the program terminates 98. If a usable signal exists (is available), it is added to the Antenna Info List 100. Thereafter the program determines if another channel is available for viewing. These routines thus add usable channels to the Channel List as well as the Antenna Info List.

The actions performed by an Antenna Info search may be summarized by the following table which, identifies what occurs during an Antenna Info search when a good strength signal is received (usable) or a bad strength signal is received (low or none).

Action	Channel List	Antenna Info List
Find good channel	Add	Update Signal Strength
Find bad channel	No Change	Update Signal Strength

Fig. 5 is a flow chart of the Antenna Info Search routine 104. Upon start of the Antenna Info search 106, the next frequency/channel in the Antenna Info List is scanned for a signal 108. If there are no more frequencies/channels and/or it is the end of a predetermined list, the program terminates 110. If a usable signal exists on the channel it is determined whether it is an analog or digital signal 112. An analog signal is added (posted) to the Channel List 114. Thereafter, the unit is ready to scan to the next frequency 108. If the signal is digital, the signal strength is measured in real-time and is updated in the Antenna Info List, and the channel is added to the Channel List 116. Thereafter, the unit is ready to scan to the next frequency 108.

At the same time the various Antenna Info screens are prompting the user, channel data grid 54 will fill with information about the channels, one per row 64, that are being received or have been received from all terrestrial antenna(s), namely, the channel number, column 58; the station name (e.g., NBC [if possible] in column 60); whether the channel is digital or analog, column 58; which antenna is picking up the channel, column 60, and for the digital channels only, their current signal strength, column 62. Other types of information may also be displayed regarding the various channels. Channel data grid 54 includes screen name 56 (Antenna Info) and displays a number of rows, here five rows 64a-e, at one time. Arrows 67 and 68 indicate there are more channels viewable through scrolling up or down the grid.

The Antenna Info screen will retain those channels that were previously measured in a past Antenna Info measurement process but aren't of sufficient strength to pass the "signal-strength threshold criterion/level" to be added to a channel list from a Channel Search. This is desirable since users may not know what local channels are available, but once they know which channels are available, it is up to the discretion of the user whether to try and adjust their

antenna(s) to make certain channels have sufficient strength to be added to a Channel Search list.

Once the signal strength measurement is complete, the Antenna Info Results Screen shown in program screen 44 will be shown on display 36. The user can navigate through the grid defined by the channel number and their various attributes or characteristics (rows 64 and columns 58, 60, 62) by scrolling up and down the looping/wrap-around list to see what channels are available using the current antenna position. Those digital channels with, for example, a “-” instead of a number indicate that the signal strength is neither sufficient for viewing the channel nor for adding the channel to a Channel List from a Channel Search, see 64d. All analog channels will have “N/A” appear as their strength to indicate that signal strength measurement is not available for those channels (see 64c). Those channels that are currently unavailable through a Channel Search can appear in the list from previous signal strength measurements or appear in the list from information obtained from a guide or as otherwise indicated herein.

If the user selects the “Antenna Info” function, then the signal strength for that channel will be measured and/or updated. As the user scrolls through different channels, the tuner tries to connect to the channel that is highlighted. If the channel is detected, the signal strength measurement is taken and/or updated. At no time are channels automatically discarded for insufficient signal strength, this helps the user to know what channels are available and to try and adjust the antenna(s) to make channels have sufficient signal strength to be added to the channel list.

The list may be sorted from lowest channel number at the top to highest channel number at the bottom. For channels where an analog and a digital channel share the same virtual channel number, the analog channel appears adjacent to the digital channel in the list.

The user can update the information for each channel simply by moving the highlight to that channel in the Antenna Info screen (see 64b). In addition, the video behind the Antenna Info display area will show the current channel, including audio, to assist the user in making antenna adjustments. To change

antennas or antenna input, the user presses ANTENNA on the remote or by menu choice. Each time a full Antenna Info Search is performed the signal strengths for all digital channels will be measured. Each highlighted channel in the grid has its signal strength updated in real-time as the audio and video for that channel are being played behind program screen 44 on display 36. In an alternative embodiment the signal strength of each available channel is not automatically displayed. The signal strength will be displayed upon selection of the channel.

When the signal strength measurement process is complete, a dialog box will appear on display 36, typically superimposed or within the current screen.

When the user selects "Continue", the highlight in the Antenna Info screen will move to the first channel row (64a) in channel data grid 54. If the user aborts the signal measurement process, a dialog box is displayed informing the user and the displayed strengths in channel data grid 54 are whatever was determined until the moment that the process was aborted.

When the channel in the list is highlighted (64b), the information about the channel is continually updated. This is particularly useful in the case where a digital channel that is transmitting a Program and System Information Protocol (PSIP) (ATSC document A/65) guide changes the channel lineup to include an analog channel with the same major channel number (**briefly define major channel**) as the digital channel. In this case, the Antenna Info list will expand to include this new analog channel as a separate entry (row 64) in channel data grid 54. The new analog channel will have the same channel number as the digital channel, but will be marked as an analog channel in column 58, as opposed to being marked a digital channel. This update and expansion of the list is totally automatic and in real-time.

In order to align the terrestrial antenna to obtain the best signal strength for a given set of digital channels, it will be most likely necessary to perform an Antenna Info Search several times for each terrestrial antenna receiving digital television signals. Signal strengths for the various digital television channels will need to be monitored with relation to the orientation of the antenna while the antenna is being positioned. By performing the Antenna Info Search many times, an optimum antenna position may be found. After the antenna has been

positioned accordingly, it is necessary to perform a Channel Search to add the channels to the Channel List.

An example will illustrate the above principles. A new terrestrial antenna (ref. antenna 26, Fig. 1) adapted to receive off-air digital television signals, is coupled to a receiving unit (ref. TV 12, Fig. 1). Assume that after power-up the initial state of both the Channel List and the Antenna Info List are empty. A Channel Search is run by the user during initial setup of the unit or because several new channels have been added after a previous Channel Search. The initial Channel Search locates two channels having signals above a given threshold level for minimal reception, namely channels "10" and "20." At this point, Channel List contains channels "10" and "20", and the Antenna Info List contains channels "10" and "20." The user then adjusts antenna 26 and performs another Channel Search. This search locates two additional channels having signals above a given threshold level for minimal reception, namely channels "30" and "40", but did not detect previous channels "10" and "20" because of the new antenna orientation. Now, Channel List contains channels "30" and "40", while Antenna Info List contains channels "10", "20", "30", and "40." Since the user knows there are four channels available, an Antenna Info Search is run each time the position of the antenna is altered slightly to try to determine an optimal position of the antenna. Channel "10" will be checked in accordance with the program flow chart of Fig. 5. Assume that now channel "10" has a signal strength greater than the predetermined threshold. Therefore, channel "10" is added to Channel List making the contents of Channel List channels "10", "30", and "40", while the Antenna Info List does not change. Another adjustment to the antenna and another Antenna Info Search is performed. Assume that now channel "20" now has a signal strength greater than the predetermined threshold. Channel "20" is added to Channel List making the contents of both Channel List and Antenna Info List channels "10", "20", "30", and "40."

While this invention has been described as having a preferred design, the present invention can be further modified within the scope of this disclosure. This application is therefore intended to cover any variations, uses, of

adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art.

WHAT IS CLAIMED IS:

1. A video processing apparatus, for receiving television signals and for generating an output signal suitable for coupling to a display device for producing a displayable image, the apparatus comprising:

5 means for selecting a television signal from a plurality of received television signals;

control means for controlling said video processing apparatus; and

means for determining the signal strength of said selected television signal, wherein

10 said control means causes said video processing apparatus to operate in one of a first mode of operation during which said selected television signal is included in said output signal for display in said displayed image; and

a second mode of operation during which said signal strength is displayed on said display device concurrently with said selected television signal.

15 2. The video processing apparatus of claim 1, wherein said means for determining signal strength includes means for updating said signal strength of said selected television signal and said second mode of operation includes showing the update of signal strength.

3. The video processing apparatus of claim 2, wherein said means for
20 updating includes means for determining whether a television signal is digital or analog, and said second mode of operation includes means for displaying whether said television signal is digital or analog.

4. A video processing apparatus comprising:

25 means for receiving a plurality of television signals having audio and video information components;

means for displaying the video information component of a selected said television signal on a display device coupled to said video processing apparatus;

means for determining signal strength of each one of the plurality of television signals; and

30 means for selectively displaying the signal strength of the selected television signals while the audio and video of the selected channel is active.

5. The video processing apparatus of claim 4, wherein said means for selectively displaying includes means for selectively displaying signal strengths of a plurality of television signals in a grid format while the audio and video of the selected television signal is active.

6. The video processing apparatus of claim 4, wherein said means for selectively displaying includes means for selectively displaying whether a television signal is analog or digital.

7. The video processing apparatus of claim 5, further comprising:
means for updating in real-time the signal strength of the selected television signal.

8. The video processing apparatus of claim 4, further comprising:
means for storing in memory a channel number associated with the television signals when the signal strength exceeds a predetermined threshold level.

9. A method of positioning an antenna for receiving digital television signals comprising:

- a. selecting an initial position for said antenna;
- b. displaying the signal strength of each received digital signal; and
- c. selecting a final reception position for said antenna based on the

measured signal strength of at least one channel.

10. The method of claim 9 wherein the step of selecting an initial position and the step of displaying is repeated until the signal strength of each received digital signal is optimized.

11. The method of claim 9, wherein the digital signals are concurrently audible and viewable during real-time display of signal strength for a selected channel.

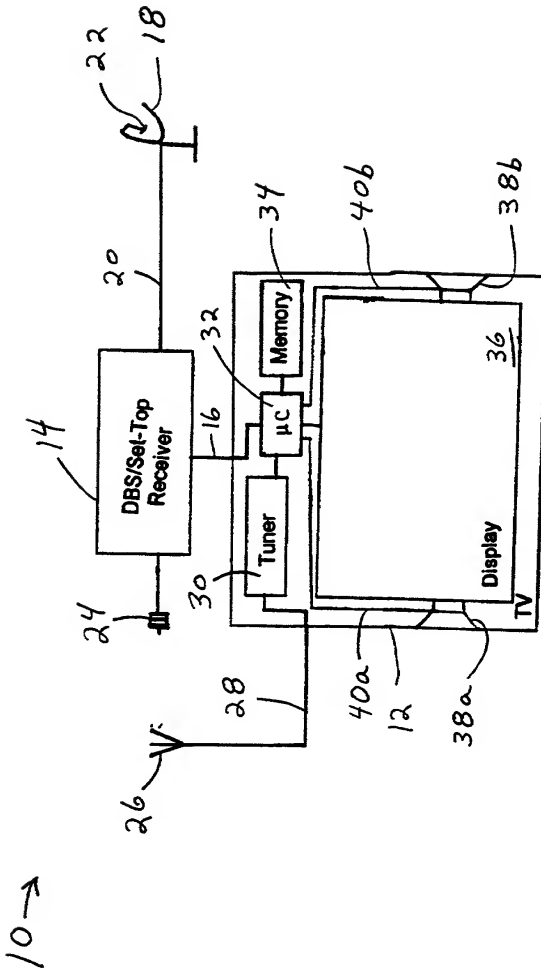
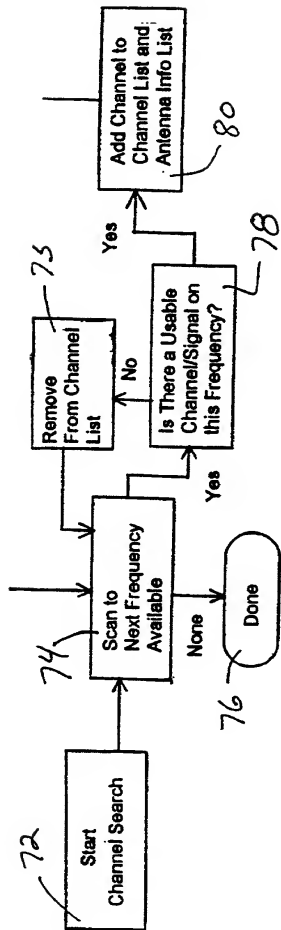
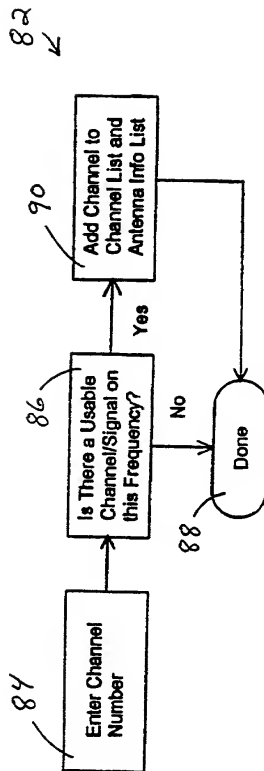


Fig. 1



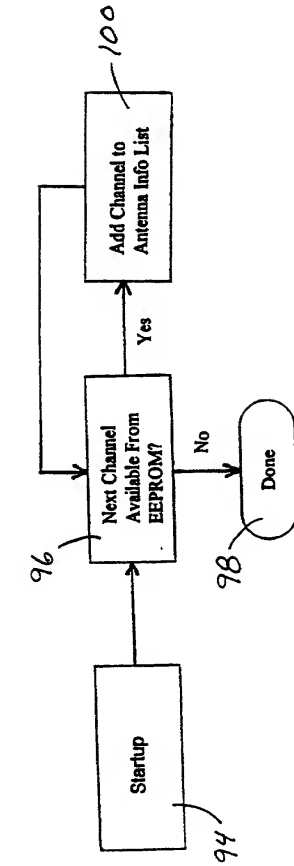
Adding Channels During Channel Search

Fig. 2



Adding Channels From Digit Entry

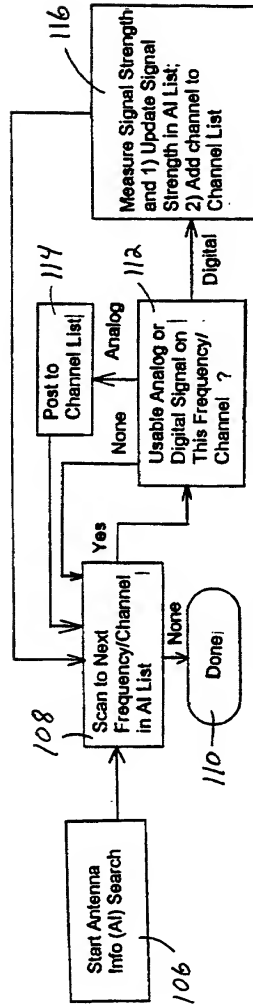
Fig. 3



Adding Channels after Power Cycle

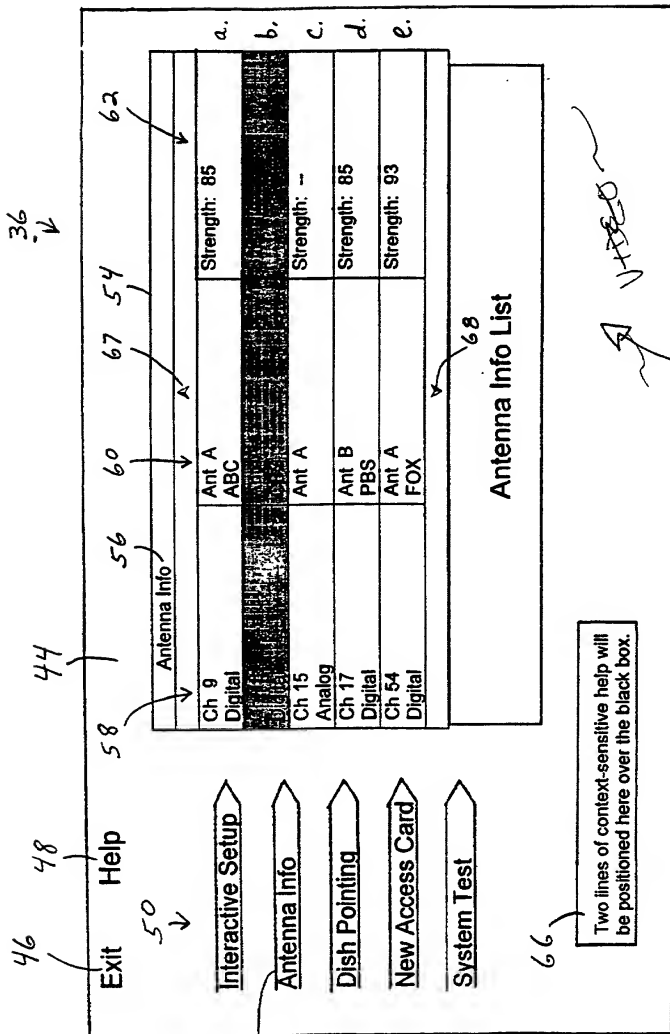
Fig. 4

104 →



Adding Channels During Antenna Info Search

Fig. 5



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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63) <input type="checkbox"/> Declaration Submitted With Initial Filing <input type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)		Attorney Docket Number	RCA 89549
		First Named Inventor	Scott Edward Klopfenstein
COMPLETE IF KNOWN			
		Application Number	/
		Filing Date	
		Group Art Unit	
		Examiner Name	

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

REAL-TIME SIGNAL STRENGTH DISPLAY OF TERRESTRIAL DIGITAL TELEVISION SIGNALS

the specification of which (Title of the Invention)

☐ Is attached hereto

OR

☒ was filed on (MM/DD/YYYY) June 8, 2000 as United States Application Number or PCT International

Application Number PCT/US00/15760 and was amended on (MM/DD/YYYY) (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

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Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY) Country	Priority Not Claimed	Certified Copy Attached?	
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			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	
60/139,467	June 16, 1999	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.
60/143,341	July 12, 1999	

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NAME OF SOLE OR FIRST INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name		Family Name or Surname	
SCOTT EDWARD		KLOPFENSTEIN	
Inventor's Signature		Date	
		10/22/01	
Residence: City	State	Country	Citizenship
FISHERS	INDIANA IN	US	US
Mailing Address			
Mailing Address 7419 Wood Court			
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NAME OF SECOND INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
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AARON HAL		DINWIDDIE	
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DECLARATION**ADDITIONAL INVENTOR(S)**
Supplemental Sheet
Page 1 of 1

Name of Additional Joint Inventor, if any:

☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))

Family Name or Surname

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SCHNEIDEWEND

Inventor's
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Name of Additional Joint Inventor, if any:

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